BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 12A

2006 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

July 2006

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South Carolina Department of Health and Environmental Control

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2006 ANNUAL UPDATE

[Data Thru December 2005]

Shellfish Management Area 12A
Shellfish Sanitation Program

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South Carolina Department of Health and Environmental Control

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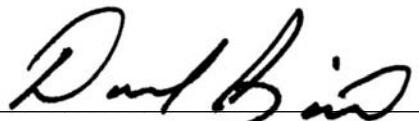

David G. Baize, Division Director
Water Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water

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Data Inclusive Dates:
01 / 01 / 03 thru 12 / 31 / 05

Classification Change:
____ Yes __X__ No

Shoreline Survey Completed: Yes

(I)ncreased/(D)ecreased/(N)one:
__N__ Approved
__N__ Conditionally Approved
__N__ Restricted
__N__ Prohibited

Prior Report & Date: Annual -2005

SUMMARY

Area 12A appears to be moderately impacted by nonpoint source pollution and routinely exhibits minor water quality oscillations. During the current three-year review period, 13 of the area's 15 shellfish monitoring stations exhibited slightly higher fecal coliform geometric mean and/or estimated 90th percentile MPN values as compared to the previous review period. These higher fecal coliform concentrations, however, do not represent a significant increase above previous review period levels and no classification changes will be implemented due to water quality; however, a small portion of Area 12A bordering Shellfish Management Area 12B near Station 12A-41 will be reclassified as Restricted.

Sample station changes will be implemented. Station 12A-10 (Cherry Point Boat Landing) will be deactivated. Water quality at Station 12A-10, as well as the stations immediately upstream (12A-31) and downstream (12A-09), consistently meets Approved area criteria. This makes Station 12A-10's usefulness limited in determining shellfish harvest classification boundaries. A new station, 12A-11A, will be created at the northern boundary of the Adams Creek Marina closure zone to better monitor fecal coliform levels upstream of Station 12A-09. Currently station 12A-09 at the mouth of Adams creek is the only active water quality sampling station monitored that receives drainage from Adams Creek. The creation of Station 12A-11A will better monitor fecal coliform levels nearer the headwaters of Adams Creek.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47, which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting

classification.

The United States Food and Drug Administration (USFDA) use The National Shellfish Sanitation Program's (NSSP) *Guide for the Control of Molluscan Shellfish* to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past year's data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey, which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved - Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree

which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters designated as Shellfish Management Area 12A (Area 12A). Area 12A consists of approximately 8,292 acres of shellfish growing area habitat located in Charleston County, South Carolina. The area consists of Adams, Bohicket, Church, Fickling, New Cut, Pine, Privateer and Raven Point Creeks. Area 12A is bounded to the east by Johns Island and to the north by Bohicket Road and the Stono River. The western border is a line, passing through Wadmalaw Island, starting at Goshen Point and ending on the western side of Adams Creek. The southern boundary is the North Edisto River.

The harvesting classifications of Area 12A prior to this sanitary survey were as follows:

Prohibited: (Administrative closure)

1. Those waters extending 1,960 feet from the Bohicket Marina in Bohicket Creek;
2. Those waters extending 1,000 feet from both the Cherry Point Seafood and East Coast Seafood commercial docks in Bohicket Creek;
3. Those waters extending 1,000 feet from the Adams Creek commercial docks in Adams Creek.

Restricted:

1. Those waters of New Cut Creek and all adjacent marshland extending from the boundary with Area 11 to Church Creek;
2. Those waters of Church Creek and all adjacent marshland extending from the boundary with Area 12B southward to Bohicket Creek;
3. Those waters of Bohicket Creek and all adjacent marshland from Church Creek southward to Station 12A-46;
4. Those waters of Bohicket Creek and all adjacent marshland from Station 12A-22 southward to the administrative closure around the Bohicket Marina.

Approved: All other waters in Area 12A.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, culture permits, and Kings Grant areas. The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina. The general public for recreational harvest primarily gathers it on a small scale. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 12A, for direct marketing purposes, from the restricted waters listed below in the Recommendations.

There are two State Shellfish Grounds (S) within Area 12A, S-172 and S-187. There are two Culture permits (C) within the area and no Mariculture permits (M) or Kings Grants (G).

The shellfish-harvesting season in South Carolina normally extends from mid-September through mid-May. The South Carolina Department of Natural Resources (SCDNR) has the

authority to alter the shellfish-harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

No substantial changes in pollution sources have occurred in Area 12A since the 2005 report.

SURVEY PROCEDURES

Shoreline surveys of Area 12A were conducted by the Trident District Shellfish Sanitation staff, by watercraft, vehicle and on foot, during the survey period and are ongoing. Extensive visual examinations of lands adjacent to the waters of Area 12A were conducted to determine potential sources of pollution entering shellfish growing waters.

Thermal Imaging

The Department recently funded a pilot project to determine the effectiveness of Forward Looking Infrared Radar (FLIR) in locating sources of pollution in close proximity to coastal shellfish harvest areas. FLIR is a type of thermal infrared imaging that can help locate contaminated "seeps" by detecting differences in water temperature, thereby providing coastal managers with smaller focus areas from which to obtain water samples and conduct shoreline survey investigations.

Regional Shellfish Program personnel prioritized study areas based upon shellfish area closures due to elevated fecal coliform levels - potentially from failing septic systems. Nighttime surveillance flights were conducted during February 2005, when relatively warm discharges from potential pollution sources such as leaking septic systems would contrast in comparison with colder river/creek surface waters. Flying during the winter also minimized interference from vegetation.

Based on thermal imagery data obtained through aerial surveillance, Region 7 Shellfish Program staff investigated potential pollution sources and, when appropriate, conducted bacteriological water quality analysis during the spring and summer of 2005. Sample locations and results of site investigations are provided in appropriate sections of this report.

POINT SOURCE POLLUTION

A. **Municipal and Community Waste Treatment Facilities** - There are no permitted wastewater facilities within Area 12A. The closest waste treatment facilities are located in Area 11 near the southern portion of Bohicket Creek. Both of these Area 11 facilities have been issued 'no-discharge' land application permits. One is on Kiawah Island (ND0017361) and the other is on Seabrook Island (ND0063347).

B. **Industrial Waste (Discharges)** - There are no permitted industrial wastewater discharges located within the boundaries of Area 12A.

C. **Marinas** – S.C. Regulation 61-47, Shellfish defines *Marina* as "any water area with a structure (docks, basin, floating docks, etc.), which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space. Bohicket Marina is located approximately four miles from the North Edisto River in Bohicket Creek. The marina offers 186 wet slips and another 100 dry storage slips in a rack system. Marina occupants have access to wastewater pump-out facilities. A Prohibited closure zone extends the full breadth of Bohicket Creek, approximately 1956 feet upstream and downstream, as measured from the centermost marina dock.

Three commercial fishery marina facilities are located within Area 12A. Cherry Point Seafood and East Coast Seafood docks are located on Bohicket Creek, approximately two and three miles, respectively, from the North Edisto River. Additionally, Adams Creek Marina is located on Adams Creek; a tributary of Bohicket Creek located approximately one-half mile from the North Edisto River. Each of these facilities typically accommodates between 6 and 10 commercial vessels and all are encompassed by administratively Prohibited closure zones. Marinas are indicated on the map of Potential Pollution Sources.

D. **Radionuclides** - Sources of radionuclides have not been identified within Area 12A, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

A. **Urban and Suburban Stormwater Runoff** - The shoreline survey conducted in Area 12A revealed the concentration of homes to be consistent throughout the area. Single-family homes continue to be built along both Bohicket and Church Creeks. Two new subdivisions are under construction on Bohicket Creek. Land clearing, associated with this new construction, can accelerate shoreline erosion. Stormwater runoff impacts water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

Stormwater permits may be used as an indicator of land disturbing activities. There were approximately 201 stormwater permits issued within Charleston County in 2005. The permits are distributed throughout the area and have been primarily issued to housing subdivisions. The remaining permits are for stormwater control for schools and churches. These areas are depicted on the attached Potential Pollution Source map. The Army Corps

of Engineers did not conduct any dredging projects during this past survey period.

The uplands surrounding the shellfish growing waters of Area 12A consist of various soil textures defined by the United States Department of Agriculture (USDA), Soil Conservation Service (1971) utilizing general classifications and descriptions. Although lands within Area 12A consist of numerous soil types, the area is generally comprised of Kiawah-Seabrook-Dawhoo soils, and occur on low, broad ridges and long, narrow-to-broad depressions in areas roughly parallel with the coastline. The USDA (1971) further describes these soils as "moderately well drained to very poorly drained, nearly level to depressional, sandy soils."

B. **Agricultural Runoff** - There are no permitted agricultural facilities located in Area 12A. However, there are many agricultural crop farms within the area.

C. **Individual Sewage Treatment and Disposal Systems** - Nearly all homes adjacent to shellfish growing waters within Area 12A are served by individual septic systems. Nonpoint source pollution within the area is of major concern. It is difficult to locate these types of sources. The Division of Environmental Health (DEH) has no documented specific septic tank failures. Each system requires inspection by the DEH, Trident Health District, and approval before final installation.

Sample Data Collected In Conjunction With Thermal Imaging Project

Sample	Longitude	Latitude	Sample Date	Sample Results
E-12	-80.115776	32.672288	April 27, 2005	16,000 FC
This sample was taken from a small tidal ditch off of Bohicket Road. There was no clear evidence of a possible source. This area will be re-inspected in future shoreline surveys.				
E-18	-80.089561	32.684047	May 18, 2005	8,000 FC
This sample was taken in the rear of a property under construction. Additional sampling of the area returned a level of 30 FC. No further action will be taken on this property.				
E-RAST			April 27, 2005	3000 FC
This sample was added while performing ground-truthing of other samples. It was collected at the stormwater ditch outfall of the old Rast Restaurant. This ditch drains a large portion of partially developed land. This location will be monitored to help identify a possible source.				

D. **Wildlife and Domestic Animals** - Area 12A supports a large population of domestic animals attributable to the number of private residences along the shores. Two areas along Bohicket Creek on Wadmalaw Island have observed livestock populations (approximately 40 animals total). Area 12A also supports a moderate wildlife population: primarily various types of waterfowl and terrestrial mammals such as deer, raccoon, and rodents, as well as marine mammals. The area has an extensive network of small tidal creeks. This creek system provides a possible conduit for animal fecal coliform bacteria to be transported to the adjacent growing waters.

E. **Boat Traffic** - Through much of the year, recreational boat traffic is moderate from the Bohicket Marina to the North Edisto River; and the boat traffic is light from the marina northward. Commercial traffic in Bohicket Creek is light and consists primarily of shrimp boats that are headed off shore. Commercial fisheries boats, ranging in size from 16 to 50 feet, operate as long as the product demand exists. During the recreational shrimp-baiting season, typically extending from mid-September through mid-November, recreational traffic is moderate.

F. **Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. Portions of the AIWW require maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to the AIWW as dredge spoil sites.

G. **Marine Biotoxins** -- Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 12A. The Shellfish Sanitation Section has developed a Biotoxin Contingency Plan in response to a *Gymnodinium breve* (formally *P. brevis*) bloom that occurred during the1987-1988 shellfish harvest season. The Department also participates in an interagency Toxic Algae Workgroup and directs a Toxic Algae Emergency Response Team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 12A consists of the waters of Adams, Bohicket, Church, Fickling, New Cut, Pine, Privateer and Raven Point Creeks. The entire area is tidally influenced by the Atlantic Ocean through the North Edisto Inlet. The creeks within the area typically range from 30 to 200 feet in width and average 2 to 25 feet in depth. The entire area is approximately 8.5 miles long (north to south) and 4 miles wide (west to east).

Tides - Tides in Area 12A are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in Bohicket Creek at the Maybank Highway Bridge are 6.1 feet during normal tides and 8.5 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Rainfall - Rainfall data used for Area 12A has been monitored by the National Climatic Data Center's Station 382730 Edisto Island 3 SW located at the Edisto Beach State Park. The Department, however, has found it difficult to obtain accurate real-time or historical rainfall data from the station. Significant data is missing for calendar years 2004 and 2005. Rainfall data is a crucial element used in the management of growing areas. Due to the obvious inconsistency and inaccuracy of data, rainfall information from Station 382730-Edisto Island 3SW will no longer be included in this report. The Department will utilize the Town of Edisto Beach electronic gauge to monitor daily rainfall. This gauge does not, however, record cumulative data.

Rainfall averages approximately forty-nine (49) inches per year, with August being the wettest month. Approximately 40% of the annual rainfall typically falls in the three-month period from June to August. Weather patterns during this time period are often characterized by thunderstorms and shower activity of short duration. The months of July, August, and September also have the greatest numbers of days with rainfall exceeding 1.00". The months of December through March historically have the greatest number of days with rainfall exceeding 0.10" and 0.50". Rainfall events during these months are typically of a longer duration.

Winds - Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

River Discharges - Freshwater rivers do not discharge directly into Area 12A. Freshwater influence is primarily due to rainfall.

WATER QUALITY STUDIES

DESCRIPTION OF THE PROGRAM

The Department currently utilizes a systematic random sampling (SRS) strategy within Area 12A in lieu of sampling under adverse pollution conditions. In order to comply with NSSP guidelines, a minimum of thirty samples are required to be collected and analyzed from each station during the review period. Sampling dates are computer generated prior to the beginning of each quarterly period thereby insuring random selection with respect to tidal stage and weather. Day of week selection criteria is limited to Mondays, Tuesdays and Wednesdays due to shipping requirements and laboratory manpower constraints. Sample schedules are rarely altered.

During July 1998, an updated shellfish water quality data scheduling and collection procedure was formalized. Samples utilized for classification purposes are limited to those samples collected in accordance with the SRS for a 36-month period beginning January 1 and ending December 31. This allows for a maximum of 36 samples per station, yet provides a six-sample “cushion” (above the NSSP required 30 minimum) for broken sample bottles, lab error, breakdowns, etc. This also allows each annual report’s water quality data to meet the requirements for the NSSP Triennial Review sampling criteria.

Five hundred forty (540) SRS routine surface water quality samples (<1.0 ft. deep) were collected for bacteriological analyses and classification purposes from fifteen (15) active water quality sampling stations in Area 12A during the period 01/01/03 through 12/31/05. Additionally, three (3) special samples associated with a November 2005 rainfall closure were collected for non-classification purposes during the period. Samples were collected in 120 ml amber glass bottles, immediately placed on ice and transported to the South Carolina Department of Health and Environmental Control's Region 7 Environmental Quality Control laboratory in North Charleston, South Carolina. An additional 120 ml water sample was included with each shipment for the purpose of temperature control. At the laboratory, sample sets exceeding a 30-hour holding time

or containing a temperature control in excess of 10 degrees Centigrade were discarded (APHA, 1970).

Surface water temperatures were measured utilizing hand-held, laboratory-quality calibrated centigrade thermometers. Salinity measurements were measured in the laboratory using an automatic temperature compensated refractometer. Additional field data include ambient air temperature, wind direction, tidal stage and date and time of sampling. Tidal stages were determined by using Nautical Software's *Tides & Currents*, Version 2 (1996).

MONITORING RESULTS

Area 12A stations exceeding a fecal coliform geometric mean MPN value of 14 were 12A-13, 12A-14, 12A-20, 12A-21, 12A-29, 12A-38, 12A-39, and 12A-40. No station exceeds a fecal coliform geometric mean MPN value of 88. Stations exceeding a fecal coliform MPN estimated 90th percentile value of 43 are 12A-13, 12A-14, 12A-20, 12A-21, 12A-29, 12A-38, 12A-39, 12A-40, and 12A-41. Stations 12A-14, 12A-38, and 12A-39 exceed an estimated 90th percentile fecal coliform MPN value of 260.

For information and documentation purposes, data collected in November to December 2005 is excluded (see Table 2-A) as Area 12A in its entirety was under a precautionary closure due to excessive rainfall (November 2005). Exclusion of these data does not alter the classification for any stations.

CONCLUSIONS

Based on review of fecal coliform bacteriological data and the pollution source survey, Area 12A appears to be impacted primarily by non-point source pollution.

NONPOINT SOURCE RUNOFF

Stormwater runoff appears to be the major source of fecal coliform bacteria throughout the area. Domestic and wild animal populations are likely contributors to excessive fecal coliform levels within the area. Moderate numbers of livestock have been observed along both Bohicket and Church Creeks.

RECOMMENDATIONS

The shoreline survey and bacteriological data review of shellfish growing Area 12A indicate that the current classification descriptions are appropriate; however, a small portion of Area 12A bordering Shellfish Management Area 12B near Station 12A-41 will be reclassified as Restricted. The harvesting classification of Area 12A for this sanitary survey is recommended:

Prohibited: (Administrative closure)

1. Those waters of Bohicket Creek, extending approximately 1,956 feet upstream and downstream from the Bohicket Marina in Bohicket Creek, as measured from the centermost dock;
2. Those waters within a radius of approximately 1,000 feet of both the Cherry Point Seafood and East Coast Seafood commercial docks in lower Bohicket Creek;
3. Those waters extending approximately 1,000 feet upstream and downstream from the Adams Creek commercial docks in Adams Creek.

Restricted:

1. Those waters of New Cut Creek and all adjacent marshland extending from the boundary with Area 11 to Church Creek;
2. Those waters of Church Creek and all adjacent marshland extending from the boundary with Area 12B southward to Bohicket Creek;
3. Those waters of Bohicket Creek and all adjacent marshland from Church Creek southward to Station 12A-46;
4. Those waters of Bohicket Creek and all adjacent marshland from Station 12A-22 southward to the administrative closure around the Bohicket Marina.

Approved: All other waters in Area 12A

Station Addition/Deactivation/Modification:

ADDITION: 12A-11A.
Description: Adams Creek, North of Adams Creek Marina
Latitude/Longitude: 32.608612 / -80.204432
Explanation: Created to monitor fecal coliform levels in Adams Creek upstream of Station 12A-09.

DEACTIVATION: 12A-10
Description: Cherry Point Boat Landing
Explanation: Consistently Approved water quality at station 12A-10. Consistently Approved water quality at stations 12A-31 and 12A-09, upstream and downstream from station 12A-10. The station's usefulness in determining shellfish harvest classification boundaries is limited.

Analysis of sampling data for Area 12A demonstrates the probability of a significant impact from rainfall exceeding 4.00" in a 24-hour period. Therefore, a precautionary closure of Area 12A will be implemented following rainfall events of greater than 4.00" in a 24-hour period, as measured at the Edisto Beach State Park located on Edisto Island. This methodology is associated with the concept of the Probable Maximum Precipitation (PMP). The National Weather Service publishes PMP estimates for the coastal United States in a series of hydro-meteorological reports (HMRs) (*National Weather Service*). PMP estimates for South Carolina's growing areas are derived from HMRs 51, 52, and 53 (*National Research Council, 1985*).

REFERENCES

American Public Health Association, Inc. *Procedures for the bacteriologic examination of sea water and shellfish,* 1970. p. 28-47. In *Recommended procedures for the examination of sea water and shellfish*, 4th ed. Library of Congress, Washington, D.C.

National Research Council, 1985, *"Safety of Dams - Flood and Earthquake Criteria"* National Academy Press, Washington DC.

National Shellfish Sanitation Program (NSSP) -- *Guide for the Control of Molluscan Shellfish,* 1997 Revision, U.S. Department of Health and Human Services, Washington, D.C.

National Weather Service. The National Oceanic and Atmospheric Administration. *Precipitation Frequency Atlas of the Western US: NOAA Atlas II*. Superintendent of Documents, US Government Printing Office - Washington DC.

United States Department of Agriculture, Soil Conservation Service, 1971. *Soil survey of Charleston County, South Carolina.* In cooperation with South Carolina Agricultural Experiment Station and South Carolina Land Resources Conservation Commission, National Cooperative Soil Survey, Washington, D.C. p. 78.

TABLE #1

Shellfish Management Area 12A
Water Quality Sampling Stations Description

Station	Description
09	Confluence of Adams Creek and Bohicket Creek
10	Cherry Point Boat Landing **(Deactivate Jan/07)**
11A	Adams Creek, northern boundary of Adams Creek Marina closure zone **(New Jan/07)**
13	Confluence of Bohicket Creek and Fickling Creek
14	S.C. Hwy 700 Bridge at Bohicket Creek **(Deactivated Jan/06)**
20	Bohicket Creek opposite Hoopstick Island
21	Bohicket Creek at causeway with two live oaks
22	Bohicket Creek at Boy Scout Camp
29	Confluence of Raven Point Creek and Church Creek
31	Southwest Boundary of Prohibited Area at Bohicket Marina
32	Privateer Creek at fork
38	Drainage discharge one-eighth mile east of power lines, north bank of Church Creek
39	Confluence of Bohicket Creek and small tidal creek just west of S.C. Hwy 700 Bridge, north side of Bohicket Creek
40	Pine Creek at first fork
41	Confluence of Church Creek and New Cut
46	Bohicket Creek midway between Stations 21 and 22 at small, unnamed tributary on west bank

(Total 15 Active For this Report)

Figure 1.
Shellfish Management Area 12A
Prior Classification

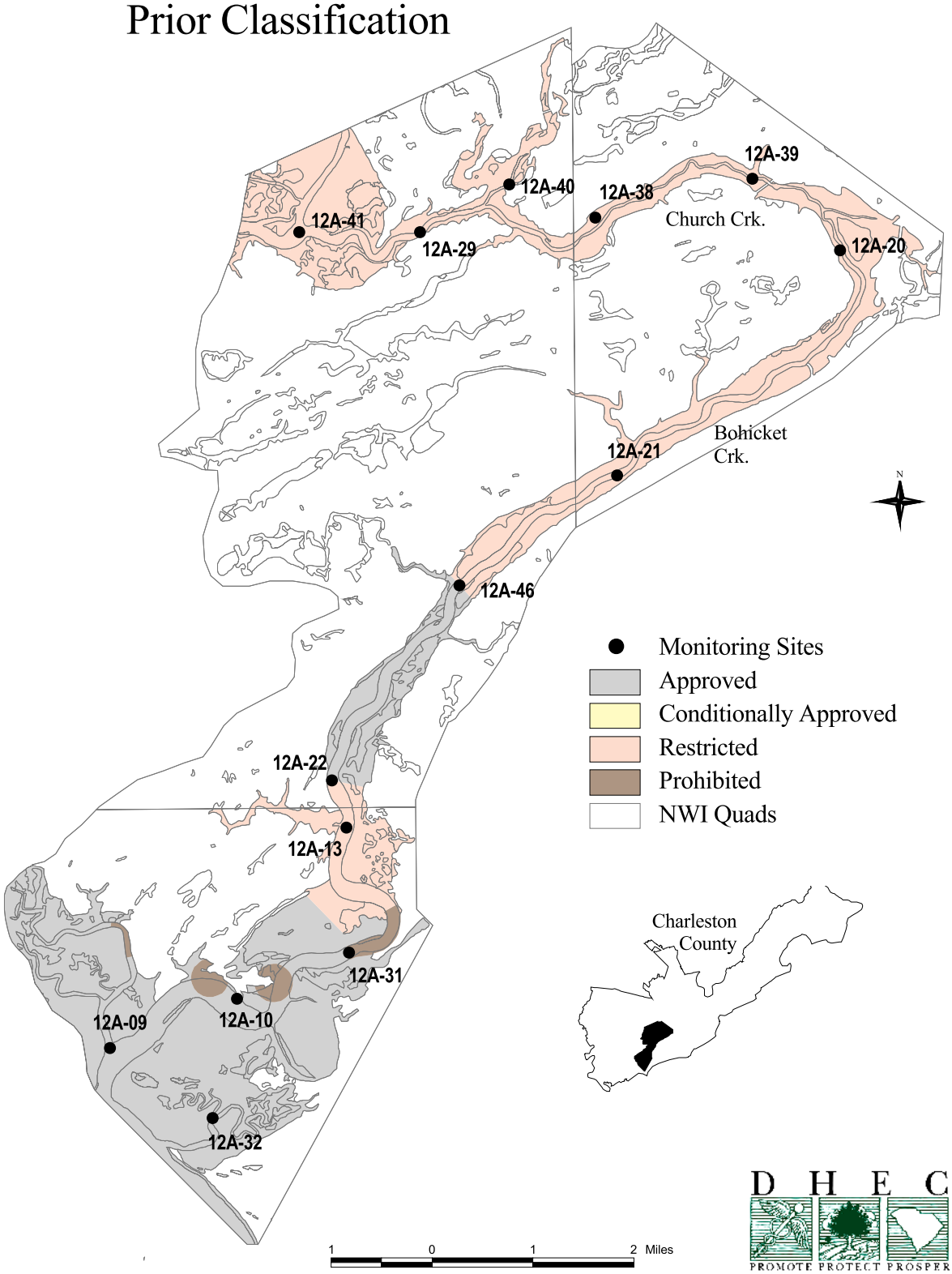

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Figure 2.
Shellfish Management Area 12A
Current Classification

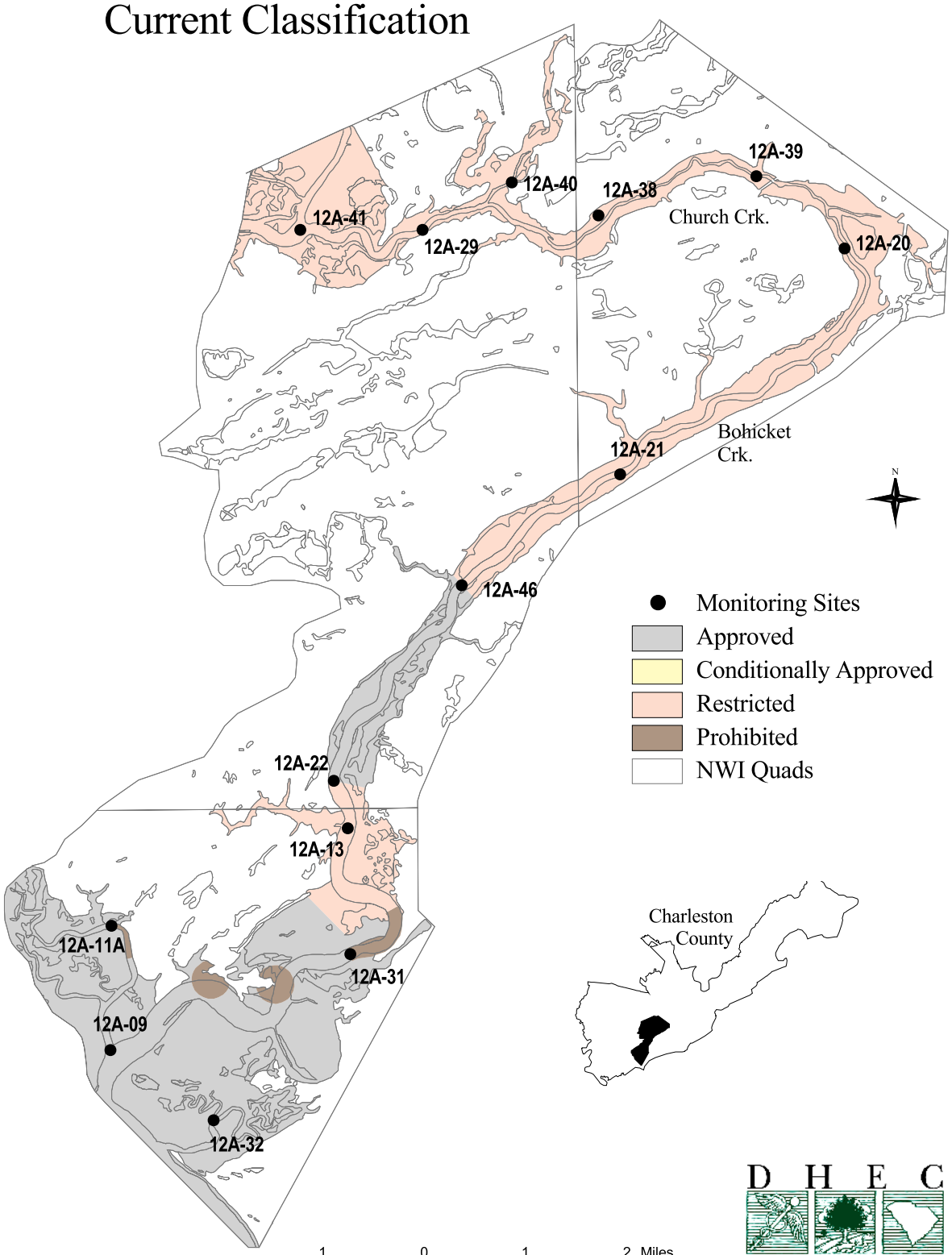

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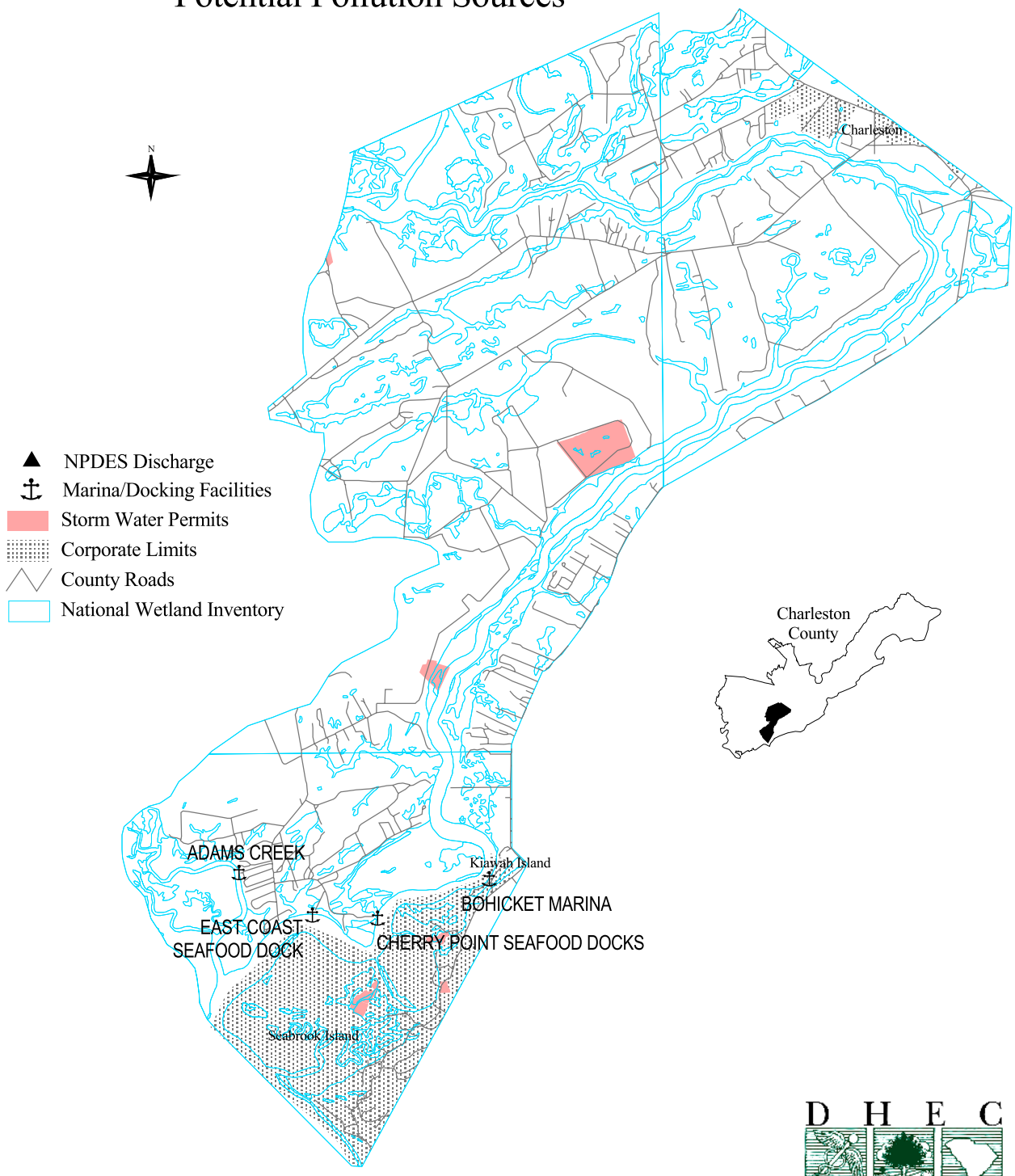
Figure 3.

Shellfish Management Area 12A

Potential Pollution Sources



D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

TABLE #2
Shellfish Management Area 12A

FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations between

January 1, 2003 and December 31, 2005

Station #►	9	10	13	14	20	21	22	29	31	32
SAMPLES	36	36	36	36	36	36	36	36	36	36
GEOMEAN	4.4	4.4	20.9	55.3	38.9	15.5	8.6	26.1	6.2	5.4
90TH %ILE	19	13	118	312	164	68	34	149	24	25
WATER QLTY	A	A	R	RND	R	R	A	R	A	A
CLASSIFICATION	A	A	R	R	R	R	R	R	P	A

Station #►	38	39	40	41	46					
SAMPLES	36	36	36	35	36					
GEOMEAN	65.6	67.3	45.7	11.7	10.3					
90TH %ILE	413	506	234	53	42					
WATER QLTY	RND	RND	R	R	A					
CLASSIFICATIO	R	R	R	R	R					

Station #►										
SAMPLES										
GEOMEAN										
90TH %ILE										
WATER QLTY										
CLASSIFICATIO										

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #2-A
Shellfish Management Area 12A

AMENDED FECAL COLIFORM BACTERIOLOGICAL DATA SUMMARY
from Shellfish Water Quality Sampling Stations between

January 1, 2003 and December 31, 2005
(Excludes November-December 2005 Data)

Station #	9	10	13	14	20	21	22	29	31	32
SAMPLES	34	34	34	34	34	34	34	34	34	34
GEOMEAN	4.0	4.1	19.5	53.3	36.9	15.0	8.1	25.5	5.6	4.9
90TH %ILE	14	11	103	314	158	68	32	152	19	21
WATER QLTY	A	A	R	RND	R	R	A	R	A	A
CLASSIFICATION	A	A	R	R	R	R	R	R	P	A

Station #	38	39	40	41	46					
SAMPLES	34	34	34	34	34					
GEOMEAN	57.8	66.4	43.8	11.3	9.3					
90TH %ILE	334	528	228	53	35					
WATER QLTY	RND	RND	R	R	A					
CLASSIFICATION	R	R	R	R	R					

Station #										
SAMPLES										
GEOMEAN										
90TH %ILE										
WATER QLTY										
CLASSIFICATION										

A - Approved **CA** - Conditionally Approved **R** - Restricted
RND - Restricted/No Depuration **P** - Prohibited

TABLE #3

Shellfish Management Area 12A

WATER QUALITY SAMPLING STATIONS DATA

Detailed data for each shellfish station listed in this report's "Fecal Coliform Bacteriological Data Summary Table", and in other shellfish reports, can be obtained through South Carolina's Department of Health and Environmental Control – Freedom of Information Office at the address below.

Freedom of Information
2600 Bull Street
Columbia, SC 29201

Any explanation or clarity needed on the report's content can be obtained by contacting the preparer(s), and/or reviewer(s) listed on the cover page.